

*Dryas octopetala.* 6. *Saxifrageæ* : *Chrysosplenium alternifolium*, *Saxifraga oppositifolia*, *nivalis*, *cernua*, *caspia*, *hirculus*, *aizoides*, and four other species not found in Britain. 7. *Compositæ*: four species, including the dandelion. 8. *Campanulaceæ* : *Campanula uniflora*. 9. *Ericaceæ* : the little shrub mentioned above. 10. *Gentianaceæ* : *Gentiana tenella*, discovered by the Rev. Mr. Eaton in 1872. 11. *Boraginaceæ* : *Mertensia maritima*. 12. *Polemoniaceæ* : one species of *Polemonium*. 13. *Scrophulariaceæ* : *Pedicularis hirsuta*. 14. *Empetraceæ* : the *Empetrum* alluded to. 15. *Polygonaceæ* : two British species, *Polygonum viviparum*, and *Oxyria reniformis*; and *Koenigia islandica*, which is of annual duration. 16. *Salicinæ* : the two species of willow given above. The remaining families—(17) *Juncaceæ*, (18) *Cyperaceæ*, and (19) *Gramineæ*—make up the rest, the latter being by far the most numerous, and embracing several British genera and species.

In a broad sense, the Arctic vegetation closely resembles the flora of the higher Alps, but there is less brilliancy and variety of colour in the flowers, yellow and white largely predominating. The plants assume a dense tufted habit of growth, and increase mainly by lateral branches, which take root and in their turn produce offsets. It is possible some or all of them ripen seeds in certain favourable seasons, but the almost total absence of annual plants, and the habit of growth of the perennials, seem to indicate that this very seldom happens. An attentive study of the distribution of Arctic flowering plants would lead us to believe that few new species remain to be discovered; and probably in the lower cryptogams also, few absolutely new forms will be found, though doubtless many known species occur that have not yet been collected. Therefore there is some justness in the complaints of geologists because no geologist has been appointed to the Arctic Expedition, whereas a botanist has been appointed. We may reproduce here the substance of an interesting note on the most northerly species of flowering plants known, which was communicated to this journal (vol. viii. p. 487) by Dr. J. D. Hooker. The four following plants, collected by Dr. Bessel in 82° N. lat., probably on the east side of Smith's Sound, represent the extreme northern limits of phanerogamic vegetation so far as at present known : *Draba alpina*, *Cerastium alpinum*, *Taraxacum dens-leonis* var., and *Poa alpina*. With the exception of the first, these are also indigenous in Britain. We have one more observation to make. Although there is what botanists term an Antarctic flora, not a single flowering plant has been found within the Antarctic circle, and only a very limited number of the lower cryptogams.

#### NOTES

THE late Sir Charles Lyell has not been forgetful of the interests of science in his will. He gives to the Geological Society of London the die executed by Mr. Leonard Wyon, of a medal to be cast in bronze, to be given annually and called the Lyell Medal, to be regarded as a mark of honorary distinction and as an expression on the part of the governing body of the Society that the medallist (who may be of any country or either sex) has deserved well of the science. He further gives to the said Society the sum of 2,000*l.*, the annual interest arising therefrom to be appropriated and applied in the following manner :—Not less than one-third of the annual interest to accompany the medal, the remaining interest to be given in one or more portions at the discretion of the Council for the encouragement of geology, or of any of the allied sciences by which they shall consider geology to have been most materially advanced, either for travelling expenses or for a memoir or paper published or in progress, and without reference to the sex or nationality of the author or the language in which it may be written. The Council of the Society

are to be the sole judges of the merits of the memoirs or papers for which they may vote the medal and fund from time to time.

LORD LINDSAY, writing from Florence to the Mayor of Wiggin, of which place his lordship is representative, states that in order to recover from the severe effect of the Mauritius fever, caught while observing the recent transit, he is obliged to stay in Italy to recruit. He hopes, however, to be able to return to England by the time Parliament resumes its sittings.

PROF. H. E. ARMSTRONG, of the London Institution, well known for his researches in organic chemistry, and Mr. W. N. Hartley, Demonstrator of Chemistry in King's College, are candidates for the Jacksonian Professorship of Experimental Philosophy in the University of Cambridge. It will be interesting to watch what course the Cambridge authorities will take with regard to the appointment to the vacant chair.

MR. E. J. NANSON, B.A., Fellow of Trinity College, Cambridge, Professor of Applied Mathematics at the Royal Indian Engineering College, Cooper's Hill, has been selected by Prof. Adams to succeed the late Prof. W. P. Wilson in the chair of Mathematics at the University of Melbourne. Mr. Nanson was Second Wrangler and Second Smith's Prizeman in 1873.

THE French National Assembly have unanimously voted the funds for the creation of a third Chair of Chemistry in the Faculty of Sciences of Paris. The new chair is to be devoted to Organic Chemistry, which, owing to the arrangements with regard to the other two chairs, has hitherto been somewhat neglected.

A CORRESPONDENT sends us the following query on the subject of Arctic Meteorology with reference to the forthcoming Arctic Expedition :—“I have noted from time to time in the pages of NATURE the various items of information respecting the outfit for the Arctic Expedition, but have failed to ascertain what, if any, preparations are being made for the observation of meteorological phenomena. We know little or nothing about the amount of aqueous deposition in the Arctic regions. Are not the vessels supplied with rain-gauges? Surely there will be many opportunities of recording the quantity of rainfall or snow-fall, during several months at different stations, or even the hourly rate of deposition at the time of storms. Anemometers, too, might be employed to register the velocity or pressure of wind.”

IN reply to Mr. Fisher's query (NATURE, vol. xi. p. 364) as to a satisfactory method of killing *Hoplophora decumana*, a correspondent recommends the following method :—First stupefy the insect by dropping it into some benzole, or similar fluid, and then pierce it with a needle that has been dipped into a solution of corrosive sublimate.

AMONG the list of Friday evening lecturers at the Royal Institution noted in last week's NATURE, we should have given the name of Prof. Tyndall, F.R.S., whose subject, however, has not yet been announced.

IN the notice of Mr. Hart's list of the flowering plants and ferns of the Arran Islands, Galway Bay (vol. xi. p. 395), we inadvertently gave *Dabcozia polifolia* as one of the West European or Atlantic types characterising this flora. This is a bog plant found in Connemara and Mayo, but it does not occur in the Arran Islands, nor are there suitable localities for it, neither is it included by Mr. Hart.

AT the next congress of French meteorologists, which is to be held at Paris in a few days, M. Leverrier will propose to experiment on a large scale for the purpose of testing the efficacy of smoke in preventing young plants from being damaged by the frosty mornings so common in April.

ON Monday, the 22nd March, the first meeting of the Governors of the London School of Medicine for Women took place on the school premises, No. 30, Henrietta Street, Brunswick Square; Lord Aberdare in the chair. The Dean gave a short history of the school. He stated that during the winter session the same courses of lectures and demonstrations had been given as in the other medical schools of the metropolis, and that the number of women students attending was twenty. It was resolved that the proposed constitution and laws should be referred to a committee for consideration, and that in the meantime the school business should be conducted by the Provisional Council as heretofore. It was then agreed that the next meeting of the governors should take place on the 3rd of May, on which day the prizes will be distributed to those pupils who have been successful in the class examinations.

THE Council of the Social Science Association has fixed October 6th to the 13th for holding the Congress at Brighton this year. It has also authorised an exhibition of sanitary and educational appliances and apparatus to be held at the same time in connection with the meeting.

A LONG and interesting letter, dated Soubat, Feb. 7, appears in Saturday's *Times*, giving some details of Col. Gordon's work in Central Africa. He seems to have been fairly successful in the object of his mission—the reduction of these lawless regions to something like order, and the abolition of the slave traffic. Lieuts. Watson and Chippendale, two young Engineer officers who were at Ragaff, about 1,000 miles above Khartoum, succeeded in making some important observations during the Transit of Venus, which are to be transmitted to the Royal Geographical Society. Lieut. Chippendale, when the letter left, was on his way to Dufé. He was to make his way across the Ashua River to Ibrahimia, and from thence to continue his march with only a few soldiers, striking inland for the Albert Nyanza. He is there to obtain a canoe at any cost, and return, if possible, from the Albert Nyanza down the Nile to Dufé, thus establishing the fact whether the Nié is navigable between these two points.

A TELEGRAM, dated Ulm, March 30, states that the African traveller Karl Manch, who is at present staying in Blaubeuren, has suffered such severe injuries in consequence of a fall that his life is despaired of.

IT is stated that a project has been formed, under the sanction of Capt. Sir John H. Glover, Mr. R. N. Fowler, and other well-known gentlemen, for the formation of a canal from the mouth of the African river Delta, on the Atlantic, in the neighbourhood of Cape Bajador, to the northern bend of the River Niger, at Timbuctoo, a distance of 740 miles.

THE French are trying to open a regular trade with Timbuctoo and Soudan via Tusalah, the chief city of Touaregs. They have recently conquered the oasis of Goleah, about 600 miles from the coast. It is from that place that M. Paul Soleillet, the enterprising Sahara explorer, will start for Tusalah, having to march a distance of only 900 miles. The colonisation of Algeria has recently received a strong impulse from more than 10,000 Alsace-Lorrainers having settled in the colony. The European population is increasing not only by a sensible flow of emigration, but by the excess of births over deaths. The colonists, exclusive of the army, now number 250,000, while the native population is not more than 2,250,000. The governor of the three provinces is General Chanzy, who has decided on the institution of three annual fairs to be held in the southern part of each province. Goleah being too far south, a city will be founded for that purpose at about 300 miles from the coast, in the eastern province. It is expected that, attracted by these fairs, Arabs and

Touaregs of the west will resume the old trade. Another French African settlement is the district south of the Gold Coast, known as Gaboon. The Marquis de Compiègne and M. Marche, who explored this region last year, are shortly to resume their explorations, which had been cut short by hostile tribes.

M. LARGEAU, another French explorer, left Algiers a few weeks ago for Rhadamez, an oasis in the central part of the Sahara. A letter dated 17th February last has been received from him. He was very well received by the Sheikh and the Djamaa, or national council of natives. Explanations were given to him as to the murder of his fellow-traveller Douraux-Duperé, whose conduct had been rather indiscreet. The Djamaa is anxious to open commercial relations with France, and M. Largeau will soon begin his return journey by another way in order to ascertain if it is not more practicable than the one by which he travelled southwards.

FROM the official report of the chamois shooting in the canton of Grisons during 1874, it appears that during the year 918 chamois, 4 bears, and 18 eagles (*Aquila fulva*) were killed in the canton. The highest number of chamois killed by one sportsman was 16; the term for shooting is four weeks in September. In 1873 the numbers were 696 chamois and 4 bears; in 1872, when the shooting term extended two weeks longer, the numbers were 766 chamois and 3 bears. The result of last year, therefore, is decidedly favourable, and evidently owing to the reduced term of shooting.

MR. F. NORCATE has recently published, under the title of "Humboldt's Natur-und Reisebilder," a selection of pictures of nature and travel from A. von Humboldt's personal narrative of travel and aspect of nature. It is edited, with a commentary, scientific glossary, and biographical notice of the author, by Dr. C. A. Buchheim. It is intended to afford to readers of German and to students of the language a pleasant variety and a relief from the standard works which as a rule form the staple of German readings in this country. The idea seems to us a happy one, and the selections are well chosen; Dr. Buchheim has well performed his part of biographer and interpreter.

A NEW edition has just been issued by Messrs. W. Hunt and Co., of the late Rev. A. B. Wharton's "Memoir of the Life and Labours of the Rev. Jeremiah Horrox," which was first published in 1859. From the present edition the translation of Horrox's Treatise on the Transit of 1639 has been omitted.

NEAR Cortil-Noirmont (Belgium) two old tombs have lately been investigated; they had the shape of mounds, and were called "the Roman tombs" by the people. In one of them many human bones were found, rusty iron weapons, and many small bronze coins, unfortunately not well preserved. In the other there were only the remains of one human skeleton, but besides this a highly ornamental glass bottle, several large bronze vases, a lamp of the same material, two silver and two gold coins, and a relief cut into rock crystal and representing a lizard. The coins are of the time of Nerva and Hadrianus.

BRICK TEA is a large article of commerce between China and Thibet. It is described as being made chiefly in the neighbourhood of Ya-tsow in Szechuen, the tea-plant from which it is made being "a hedgerow tree, fifteen feet high, with a large and coarse leaf." The tea is done up in packets, each containing four bricks and weighing five pounds, and is bought at Tatsien-lu for about 6s. 4d.; it sells at Lhassa for 1l. 4s. to 1l. 8s., and at a much greater sum in the districts which lie off the grand road. From these facts it is apparent that the Darjeeling planters could supply Lhassa with tea at prices to undersell the Chinese article at a very considerable profit, and could make a still larger profit by supplying the country which lies between Lhassa

and the frontier of Sikkim. The better class of teas cost at Lhassa about two rupees per pound, but are seldom imported. It is estimated that the annual supply of tea to Thibet amounts to about six millions of pounds, producing an income of not less than 300,000.

A NEW source of caoutchouc reaches us from Burmah, a description of which has been given in a pamphlet published in Rangoon. The plant yielding this caoutchouc is the *Chavannesia esculenta*, a creeper belonging to the natural order Apocynaceae, an order which includes the Borneo rubber plant *Urecoela elastica*, the African rubber plants *Landoiphia* spp., as well as other genera yielding milky juices. The plant, which is common in the Burmese forests, is said to be cultivated by the natives for the sake of its fruit, which has an agreeable acid taste. It comes into season when tamarinds are not procurable, and finds a ready sale at Rangoon, at an anna per bunch of ten fruits. The milk is said to coagulate more readily than that of *Ficus elastica*, and to be purer and better for most purposes for which rubber is used.

UNDER the title of "Contributions to the Fossil Flora of the Western Territories, U.S., Part I. The Cretaceous Flora, by Prof. Lesquereux," Prof. Hayden has published the sixth volume of the series of final reports of the United States Geological Survey of the Territories. The work is in quarto, and embraces 136 pages and thirty plates. Very many new species are figured and described. The work covers all the known species of the Dakota group, and constitutes an important starting-point for similar monographs of other divisions of the fossil plants of America. Prof. Lesquereux considers the surface and stratigraphical distribution of the species. In accordance with Dr. Hayden's views, the author finds the group to be of marine origin, as shown by the occurrence of various species of marine molluscs. Prof. Lesquereux is not prepared to commit himself in regard to the correlation of the flora of the Dakota group with that of subsequent geological epochs and their identity, preferring to wait the gathering and examination of other series. He, however, states that this flora, without affinity with any preceding vegetable types, without relation to the flora of the Lower Tertiary of the United States, and with scarcely any forms referable to species known from coeval formations in Europe, presents, as a whole, a remarkable and, as yet, unexplained case of isolation.

THE cultivation of the tobacco plant in Algeria has been carried out very successfully, the soil and climate of that country being well suited to the growth of the plant. In 1874 no less than 4,850,000 kilogrammes, or over 9,700,000 lbs., were produced and passed through the State warehouses. The value of this crop was 141,224l., or nearly double that of 1873. The experiment—though it is no longer merely an experiment, but a practical industry—has been carried on since 1847, and during the past twenty-seven years about 140,000,000 lbs. weight of tobacco has been produced and sold.

It is stated that the Italian Government, following the course it has already adopted on previous occasions, will gratuitously distribute this year 5,000 plants of the *Eucalyptus globulus*, for cultivation in the Agro Romano, especially in the spot infected by malaria.

THE additions to the Zoological Society's Gardens during the past week include an African Civet Cat (*Viverra civetta*), presented by the Earl of Harrington; an Australian Monitor (*Monitor gouldii*), presented by Dr. Pardoe; three Black-necked Storks (*Xenorhynchus australis*) from Malacca, purchased; a Blue-faced Green Amazon (*Chrysotis bouqueti*) from St. Lucia; two Yellow-fronted Amazons (*Chrysotis ochrocephala*) and a Brown-throated Conure (*Conurus eruginosus*) from S. America, deposited.

#### ACCIDENTAL EXPLOSIONS \*

THE term "accident," applied in its strict sense to disasters caused by explosions, would imply that these were due to some circumstance, or combination of circumstances, entirely unforeseen, and that they were consequently unpreventable. An explosion which occurs during the preparation or investigation of a compound the explosive nature of which is as yet unknown may be purely accidental, but if, after the properties of the substance have been thoroughly ascertained and made known, an explosion occurs during its production, by some person who has not properly made himself acquainted with or has neglected in some point or other those conditions essential to its production with safety, the knowledge of which is within his reach, the term "accidental" can certainly not be properly applied to it, although in all probability it would be so designated popularly, and even by those entrusted on behalf of the public with the investigation of its origin and results.

In the present discourse the definition "accidental" is accepted in the loose sense in which it is popularly applied to explosions, with the object of examining into the nature and causes of such explosions, and, if possible, of indicating directions in which there may be hope of successful efforts being made for reducing the frequency of their occurrence.

The phenomena attendant upon an explosion are generally due to the sudden or very rapid expansion of matter, accompanied in most instances by its change of state from solid or liquid to gas or vapour. The most simple classes of explosions are those caused by the sudden yielding to force, exerted from within, of receptacles in which a gas is imprisoned in a highly compressed condition, or a liquid has been raised to a temperature greatly exceeding that at which its molecules have a tendency to fly asunder or to assume the state of vapour or gas. The strength or elasticity of the envelope which confines them suddenly yielding to pressure, the liquid passes with great rapidity into vapour, violently displacing by this sudden expansion the surrounding air and any other obstacles opposed to the expanding molecules.

Similar explosive effects less simple in their origin are brought about by the sudden development of chemical activity in mixtures of gases or vapours, of solids and gases, or of solids only, or in chemical compounds of unstable character, the result in all such instances being the development of intense heat and the sudden or very rapid and great expansion of matter.

Examples of the most simple class of explosions are the sudden failure in strength at some particular point, or generally, of the material composing a vessel in which a gas has either been liquefied or highly compressed. Accidental explosions of this character take place chiefly, and happily not very frequently, in the laboratory or lecture-room, yet instances occasionally occur of disastrous explosions resulting from such causes in manufacturing operations, or in the practical application of compressed air or other gases. The most recent illustration of a serious accidental explosion of this kind is that which occurred in the Arsenal at Woolwich in January 1874, with the air-chamber of a Whitehead, or Fish-torpedo, when one man lost his life and several were seriously injured. In this instance some part of the soft steel diaphragm closing the chamber in which the motive power of this self-propellant torpedo (air) was imprisoned under a pressure of about 800 lb. on the square inch, suddenly yielded to the efforts of the gas to return to its normal condition.

Other explosions of this class, which are of more than weekly occurrence, and but too frequently result not merely in destruction of property, but in more or less serious loss of life, are due to the bursting of boilers at factories, mines, and collieries, to say nothing of those which occur in buildings, in connection with heating appliances and with kitchen ranges, and bath- or other heating-arrangements. The explosion of a boiler may arise either from an exceptionally rapid development of steam or from an absence, or failure in the proper operation, of appliances for relieving the pressure in a boiler, by permitting the escape of steam and giving warning when the pressure begins to exceed that of safety. But by far the chief causes of boiler explosions are defects in their construction or repair, and the reduction in thickness of the metal in parts by corrosion or oxidation, internally and externally, from long use, and neglect of proper measures for periodically cleaning the boilers.

The accidents due directly to the deposits formed from water in boilers have been very greatly diminished of late years by the

\* Abstract of a lecture delivered at the Royal Institution, March 12, by Prof. F. A. Abel, F.R.S.